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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/827,307	04/06/2001	Tadahiro Ohmi	P 280043 EL00026CDC	4153
909	7590	01/25/2005	EXAMINER	
PILLSBURY WINTHROP, LLP P.O. BOX 10500 MCLEAN, VA 22102			ALEJANDRO MULERO, LUZ L	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 01/25/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/827,307

Applicant(s)

OHMI ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification, as originally filed, fails to provide support for the negative limitation "wherein the auxiliary electrode lacks any part that prevents a drift of electrons in the vicinity of the auxiliary electrode in a direction parallel to a front surface of the auxiliary electrode and a back surface of the auxiliary electrode" in claim 1, lines 11-13.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 10 is rejected under 35 U.S.C. 102(e) as being anticipated by Shan et al., U.S. Patent 6,232,236.

Shan et al. shows the invention as claimed including a plasma processing apparatus comprising: a first electrode 215 on which a substrate 164 subjected to a plasma process is placed; a magnetic field applying means 270 for applying a magnetic field to a surface of the substrate to which the plasma process is applied; an auxiliary electrode 220 provided on an outer periphery of said first electrode to excite plasma in the vicinity of the auxiliary electrode (see Fig. 2 and col. 3-line 30 to col. 5-line 10). The apparatus is capable of producing the plasma electron drift as claimed and is capable of applying a static magnetic field if so desired. Also, note that the first electrode and the auxiliary electrode can be powered by the same RF source 302 (see Fig. 3), and have the same frequency but different phases.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shan et al., U.S. Patent 6,232,236 in view of Dornfest et al., U.S. Patent 5,949,409.

Shan et al. is applied as above and further discloses an auxiliary electrode having a front surface with a difference in plasma density than the back surface of the auxiliary electrode but does not expressly disclose covering the auxiliary electrode with insulating material. Dornfest et al. discloses an apparatus in which an electrode is protected from the plasma atmosphere with an insulating material (see, for example, the abstract, col. 4-line 45 to col. 5-line 40, and fig. 16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Shan et al. as to cover the auxiliary electrode with an insulating material in order to protect it from the plasma atmosphere.

With respect to claim 9, note that it would have been obvious to one of ordinary skill in the art at the time the invention was made to cover the auxiliary electrode with an insulating material on the front surface and not on the back surface because the front surface is the area which is most exposed to plasma and therefore is most susceptible to damage from the plasma atmosphere.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shan et al., U.S. Patent 6,232,236 in view of Ohmi et al., WO 98/39500.

Shan et al. is applied as above but does not expressly disclose a plasma processing method including applying a static magnetic field. Ohmi et al. discloses applying a static magnetic field for achieving uniform processing results while allowing for a miniaturized apparatus (see abstract and paragraph bridging pages 1 and 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Shan et al., as to as apply a static magnetic field in order to achieve uniform processing results while allowing for a miniaturized apparatus.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asamaki et al., U.S. Patent 4,950,956 in view of Okumura et al., U.S. Patent 6,297,165 B1.

Asamaki et al. shows the invention substantially as claimed including a plasma processing apparatus comprising a first electrode 22 on which a substrate 25 subjected to a plasma process is placed and magnetic field applying means 30 for applying a magnetic field to a surface of the substrate 25 to which the plasma process is applied (see Figs. 1-8 and col. 2-line 49 to col. 4-line 52).

Asamaki et al. lacks anticipation of an auxiliary electrode provided on an outer periphery of said first electrode to excite plasma by the auxiliary electrode so as to cause electrons in the plasma to drift from a front surface to a back surface of said

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auxiliary electrode and from the back surface to the front surface of said auxiliary electrode. Okumura et al. discloses an auxiliary electrode 11 provided on an outer periphery of a first electrode 7 on which a substrate 8 lies which excites plasma from a RF source 10 (see Fig. 3 and col. 4-line 43 to col. 5-line 38), and in which inherently a difference in plasma density will be created between the front and back surfaces. In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Asamaki et al. so as to contain the auxiliary electrode structure of Okumura et al. because this allows for accurate measuring of the self-bias potential (see abstract). Furthermore, the incorporation of the auxiliary electrode feature of Okumura et al. into the Asamaki et al. reference would inherently produce an apparatus capable of producing the plasma electron drift as claimed. Moreover, note that the first electrode 7 and auxiliary electrode 11 of Okumura et al. are both powered by the same RF source 10 and the auxiliary electrode 11 has a capacitor 23 connected therewith which will alter the phase (see Fig. 3).

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asamaki et al., U.S. Patent 4,950,956 in view of Okumura et al., U.S. Patent 6,297,165 B1 as applied to claim 10 above, and further in view of Dornfest et al., U.S. Patent 5,949,409.

Asamaki et al. and Okumura et al. are applied as above but do not expressly disclose covering the auxiliary electrode with insulating material. Dornfest et al.

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discloses an apparatus in which an electrode is protected from the plasma atmosphere with an insulating material (see, for example, the abstract, col. 4-line 45 to col. 5-line 40, and fig. 16). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Asamaki et al.

modified by Okumura et al. as to cover the auxiliary electrode with an insulating material in order to protect it from the plasma atmosphere.

With respect to claim 9, note that it would have been obvious to one of ordinary skill in the art at the time the invention was made to cover the auxiliary electrode with an insulating material on the front surface and not on the back surface because the front surface is the area which is most exposed to plasma and therefore is most susceptible to damage from the plasma atmosphere.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Asamaki et al., U.S. Patent 4,950,956 in view of Okumura et al., U.S. Patent 6,297,165 B1 as applied to claim 10 above, and further in view of Ohmi et al., WO 98/39500.

Asamaki et al. and Okumura et al. are applied as above but do not expressly disclose a plasma processing method including applying a static magnetic field. Ohmi et al. discloses applying a static magnetic field for achieving uniform processing results while allowing for a miniaturized apparatus (see abstract and paragraph bridging pages 1 and 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Asamaki et al. modified by

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Okumura et al., as to as apply a static magnetic field in order to achieve uniform processing results while allowing for a miniaturized apparatus.

Response to Arguments

Applicant's arguments with respect to claims 1-10 have been considered but are not persuasive.

Regarding the rejection under 35 USC 112, first paragraph, applicant argues that proper support in the specification, as originally filed, is present for the limitation "wherein the auxiliary electrode lacks any part that prevents a drift of electrons in the vicinity of the auxiliary electrode in a direction parallel to a front surface of the auxiliary electrode and a back surface of the auxiliary electrode". The examiner respectfully disagrees since a portion of the electrode itself will prevent a drift of electrons in the vicinity of the auxiliary electrode in a direction parallel to a front surface of the auxiliary electrode and a back surface of the auxiliary electrode. For at least these reasons, the rejection under 35 USC 112, first paragraph, is maintained.

Concerning the rejection of claim 10 under 35 USC 102 using the Shan et al. reference, applicant argues that Shan et al. is not capable of producing the plasma drift as claimed because of the L-shape structure of the auxiliary electrode. The examiner respectfully disagrees because even though the L-shape is an obstacle to electrons drifting to the bottom side, at least a portion of the electrons will circumvent the L-shape auxiliary electrode and reach the bottom surface. With respect to the static magnetic field, Shan et al. is capable of applying a static magnetic field if so desired. Regarding

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the phase applied to the wafer support kit and the process kit in Shan et al., note that since the signal traverses different distances to the process kit and the wafer support kit the respective signals are necessarily out of phase to some extent.

In response to applicant's argument that applicant's reason for having an insulating layer on the auxiliary electrode is different than in Dornfest et al., the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Furthermore, also note that the front surface of the auxiliary electrode will inherently have a different plasma density than the back surface because of, for example, interactions with the surface of the workpiece.

With respect to the rejection of claim 7 under 35 USC 103(a) using the combination of the Shan and Ohmi references, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Concerning the rejection under 35 USC 103 using the Asamaki et al. and Okumura et al. references, applicant argues that there is no suggestion or motivation in Okumura et al. that by applying an appropriate magnetic field, the electrons will drift as required by the claims. However, all of the elements required by applicant to produce such an electron drift including the auxiliary electrode and magnets will be present by the combination of the Asamaki et al. and Okumura et al. references. Furthermore, the

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fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Regarding the argument that Asamaki et al. fails to teach the presence of an auxiliary electrode and that in Okumura et al. the electrons will not drift because of the DC bias on the substrate electrode, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Concerning the argument that Asamaki fails to show a static magnetic field, the examiner respectfully submits that the rotating magnetic field is one embodiment and Asamaki implies that embodiments where the magnetic field is not out of phase are also contemplated (see col. 3-lines 5-12 with words like "in this embodiment" and ", if desired").

With respect to applicant's argument that Okumura does not use the capacitor 23 to alter the phase, the fact that applicant has recognized another advantage which

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would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Furthermore, the fact that Okumura measures the self-biasing potential does not mean that the reference teaches away from controlling the drift of electrons, as suggested by applicant.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Luz L. Alejandro
Primary Examiner
Art Unit 1763

January 24, 2005